

Article

Monetary Effect of the Financial Crisis: A Statistical Evidence of the Norwegian Crisis¹

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Abstract

Reinhart and Rogoff (2008, 2009) picked up five financial crises as the most catastrophic case in the recent economic history. They are crisis in Finland, Japan, Norway, Spain, and Sweden. They showed that the “this time is different” syndrome had been repeated many times. This paper takes up two major economic crises among them: Norway and Japan. Norway and Japan had experienced the severe financial crisis after the rapid asset price increase in almost the same period. However the recovery was fast in Norway, while Japan experienced a prolonged recession, so called lost two decades. This study explains the difference and similarity of two crises, comparing the factors behind the bubble and bust in Norway and Japan.

The paper focuses on the role of monetary policy in both countries. Miyagawa and Morita (2008, 2013) statistically analyzed the important role of money in the up and down swing of economy in the Japan’s economy. They had paid attention to the role of expectation in the money demand. The same VAR model was performed to the Norwegian crisis, taking into consideration the financial anxieties in the period of financial boom and crisis. The estimation results showed that money played the important role in the bubble and bust in Norway as well.

Keywords: deregulation, monetary easing, bubble, financial anxieties

JEL classification: E22, E44

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1 Introduction

Three Nordic countries, Norway, Finland and Sweden had experienced the severe financial crisis after the rapid asset price increase in almost the same period. The banking crisis in Norway had occurred in 1987-1993, the crisis in Finland in 1991-1994, and the crisis in Sweden in 1990-93. The financial crisis also occurred in Japan after the bust of bubble in 1990. A typical boom-bust cycle would seem to follow the similar path; a rapid expansion of credit following the financial deregulation, the fierce competition among financial institutes, lack in risk management on the part of financial institutes, problems of asymmetric information, bullish expectation and euphoria among the people, bubble bust due to the external shock, increase in nonperforming loan, deterioration of balance sheet of financial institutes, credit crunch, financial crisis. These factors are observed in common among the countries which experienced the bubble and bust, though there seems to be significant differences in terms of scale and timing.

However the most important common factors behind the bubble and bust are the financial deregulation and monetary easing. Only financial deregulation does not create the asset bubble without monetary easing. For example, B. Eichengreen and C. Arteta (2000) indicate that bubble and bust occurred when financial deregulation and macroeconomic economic environment combine to create the asset bubble after investing the lending boom episodes of more than 90 countries. H. Shigemitsu (1995) also showed the same scenario in the process of the bubble and bust after examining the asset price inflation of major countries. Many researches have been done about the Japan's bubble and bust. Bernanke and Gertler (1999) and Ahearne et al. (2002) reached the similar conclusion from the analysis of Japan's economy in different way. Bernanke and Gertler concluded that Japanese monetary policy was too tight after the bust of bubble in the beginning of 1990s, using a monetary policy rule. Ahearne et al. stated that deflation could have been averted through early monetary easing by using a macroeconomic model of the Japanese economy (FRB/Global). Both researches suggested that the delay of monetary easing deepened and prolonged the depression.

The Bank of Japan published several papers to prove the ineffectiveness of monetary policy in the deep deflationary economy. For example BOJ (2003) showed that there exists no more cointegration among money stock and the real economic variables based on formal statistical tests. Miyagawa and Morita (2008, 2013) statistically clarified the important role of money in the up and down swing of economy, by taking into consideration the role of expectation in the money demand. Once the economy fall into the severe deflation, people tend to increase the precautionary demand which has not a positive effect on the economy, even if central bank try to increase money stock. They adopted the idea of precautionary demand, defined by the difference between actual money stock and transaction demand. Precautionary money demand crucially increases in the deep depression, which decrease the transaction demand.

The aim of the paper is to examine how the Norwegian economy experienced bubble -

bust and recovered from the severe financial crisis. Japan's depression continued for much longer period, though the recovery of three Nordic countries was very prompt. The paper will start with the chronological explain of financial crisis of Norway and Japan respectively in section 2 and 3. The paper will perform the statistical analysis by VAR model on the Norwegian financial crisis in section 4. The conclusion will be summarized in section 5.

2 Norway's Financial Crisis

In Nordic countries, credit rapidly expanded in the around 1985 because of the financial deregulation. Three Nordic countries, Finland, Sweden, and Norway had experienced the rapid rise and fall in the asset price in the years around 1990. In Denmark, the asset inflation was not as sharp as in other three countries². Banks became very competitive to make a loan to the commercial and residential property as well as stock. Because of the strong competition, nominal interest rates were kept at a low level. Moreover real interest rates were even lower, sometimes negative due to the inflation and tax advantage. Expanded loan rapidly increased the asset prices. The rise in asset prices enhanced the capability of firms and households to borrow funds. Asset prices rapidly increased and created the speculative bubbles. However the bubble had suddenly busted. The burst of bubble caused an amount of nonperforming loans which hampered the financial system. The collapse of the banking system damaged the real sector of the economy through the disintermediation of the credit. The common factors behind the asset bubble are the financial liberalization and monetary easing. Financial liberalization itself does not create the bubble without monetary easing. The process of the rapid rise and fall of the asset prices in Norway will be examined in this section³.

2.1 Financial regulation in Norway

In Norway, banks were heavily regulated in both the quantity and rates for their lending by the mid-1980s as in other Nordic countries. The interest rates were artificially kept at a low level. The excess demand for lending was controlled by the credit rationing. Banks were also required to invest in government bonds. Foreign exchange and international capital movements were also strongly regulated. The government controlled the financial system through the subsidized loans to politically important sectors, such as the residential sector, and industrially depressed regions in the northern Norway. They still continued to provide the subsidized funds on a large scale even after the housing are already enough.

The strongly regulated financial system was kept even after government changed to a

² The reasons why the asset inflation was not strong in Denmark come from the fact that the country had joined the European Economic Community (now the European Union). As a result, the deregulation process had already started around 1975 and interest rates were relatively high to meet the exchange rate targets within the European Monetary System. See Howells Peter and Keith Bain (2008) P. 175.

³ The section mainly depends on E. Steigum (1992, 2005) and Timothy Edmonds (2008).

conservative party. The reasons why Norway preferred to keep a government controlled financial system are summarized in the following three factors, according to E. Steigum (1992)⁴. 1. Strong political pressure groups gained considerably from the subsidized loans. 2. Norwegian politicians had strong anti-market sentiments. 3. Many households and firms had lots of debts. High debts of the firms and households have been special features of the Norway's credit market. However the Central Bank and Ministry of Finance was obliged to follow the international trend toward deregulation

2.2 Financial deregulation

The Norwegian economy was stagnant affected by the international economy in the beginning of 1980s. The GDP growth rate fall into almost zero percent in 1982 as shown in Figure 1. The Norges Bank (Central Bank of Norway) kept the monetary easing and a financial deregulation has started in 1984, which has triggered the excessive credit expansion. Due to the abolition of the regulation of new branch establishments, the number of branches rapidly increased. The branches of commercial banks and savings banks increased by 15% and 5.5% respectively from 1983 to 1987. The number of employees had increased by 28% in savings banks and by 19% in commercial banks from 1983 to 1987. The loans mainly expanded to the newly established small firms, real estate, construction, and services industries. The lending by financial institutions to firms and households grew at 12% from 1984 to 1986, roughly three times of the average growth rate in the years prior to deregulation⁵. The easy monetary policy had continued until The Norges Bank raised interest rates to protect the Kroner from depreciating in December 1986. The commercial banks expanded the loans under the fierce competition with non-bank financial institutions which were less regulated under the easy monetary conditions. Figure 2 indicates the growth rate of bank lending and Figure 3 shows the GDP ratio of total credit. Figure 2 shows that bank lending rapidly increased in 1984. Figure 3 shows that its GDP ratio increased from 30 % in 1984 to 60% in 1988.

Table 1 The Process of Financial Liberalization in Norway

1980	The rates for individual loans were not regulated; rather the average level was regulated through interest rate declaration from the Ministry of Finance
1984	Supplementary reserve requirements were removed
1985	Interest rate declaration were removed and interest rate monitoring was introduced
1986	Supplement reserve requirements were reintroduced. The limits of the commercial and savings bank borrowing facility at the Norges Bank were increased markedly. Foreign banks were permitted to open subsidiaries.
1987	The supplementary reserve requirement were removed. Perpetual subordinate capital was excluded from the limitations on approved loan capital. The Banking, Insurance and Securities Commission issued guidelines for assessing nonperforming loans and entering them in accounts.
1989-91	Remaining foreign exchange controls were removed.

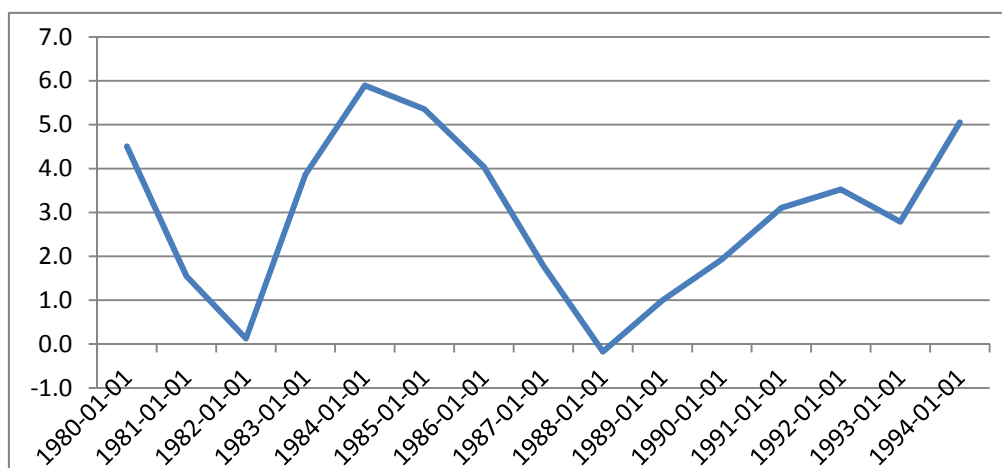
⁴ E. Steigum (1992), P.3.

⁵ E. Steigum (1992), P.11.

1990	Foreign banks were allowed to operate through branch offices.
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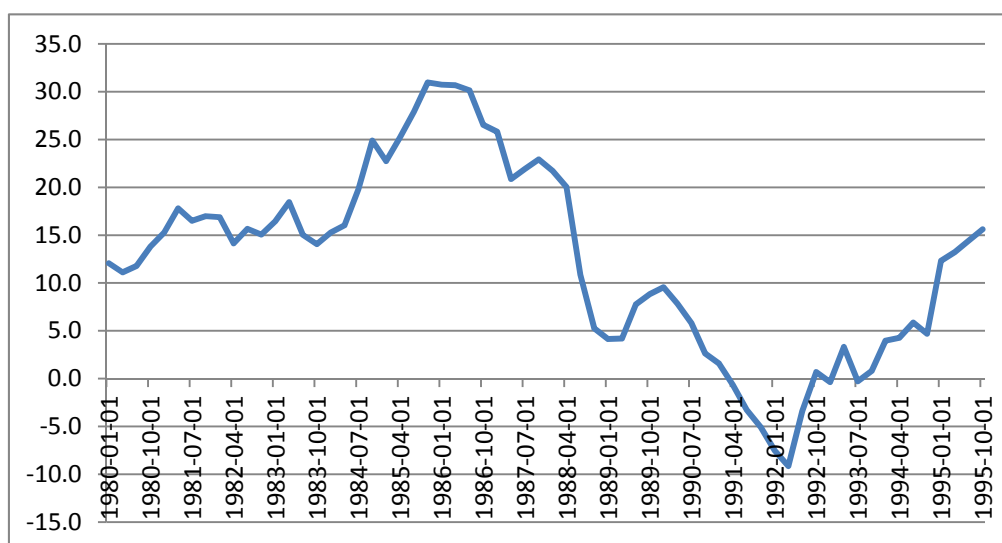
(Source) Jarmo Pesola (2001) p.52.

Figure 1 Real GDP growth rate (year on year %)



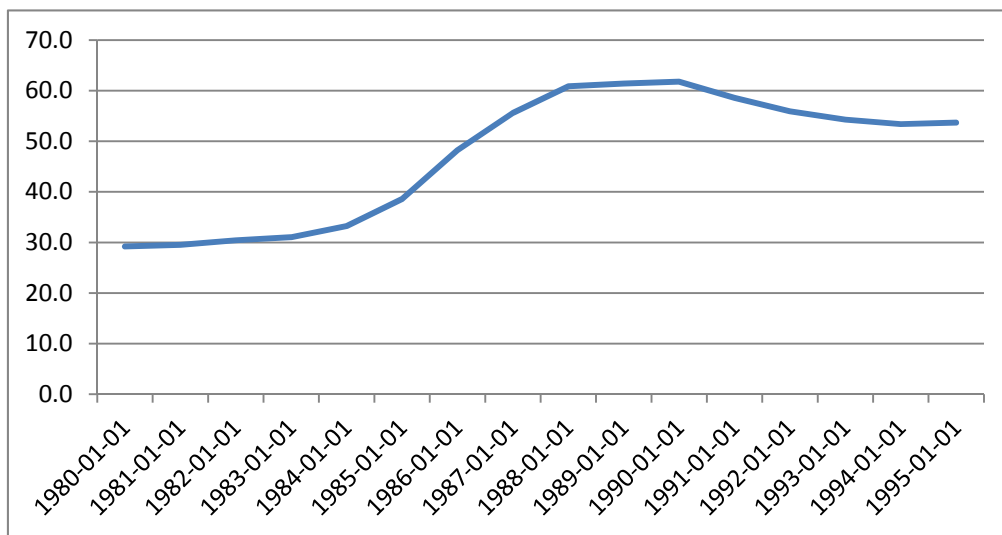
(source) FRED St. Louise FRB Data Base

Figure 2 Bank Credit growth rate (year on year %)



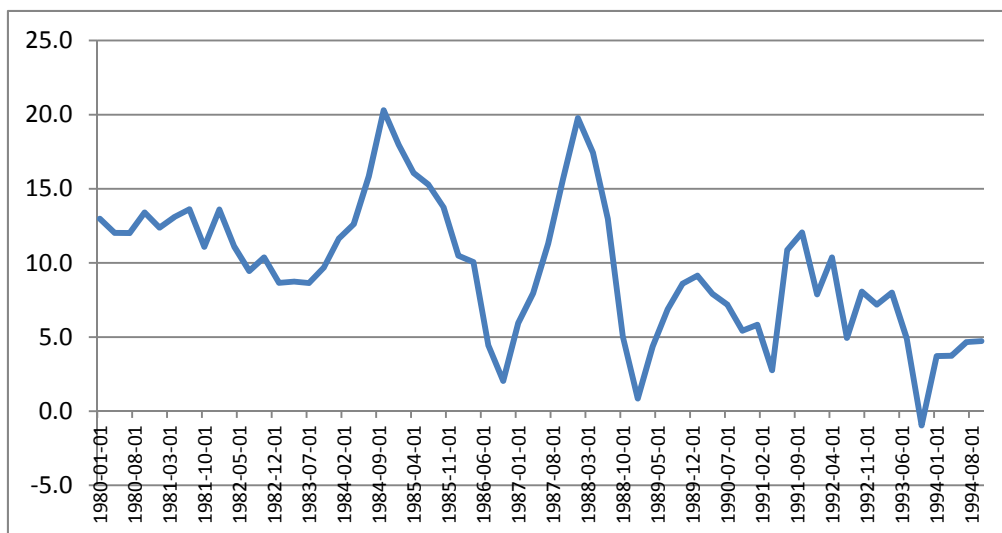
(source) FRED St. Louise FRB Data Base

Figure 3 Bank Credit (GDP %)



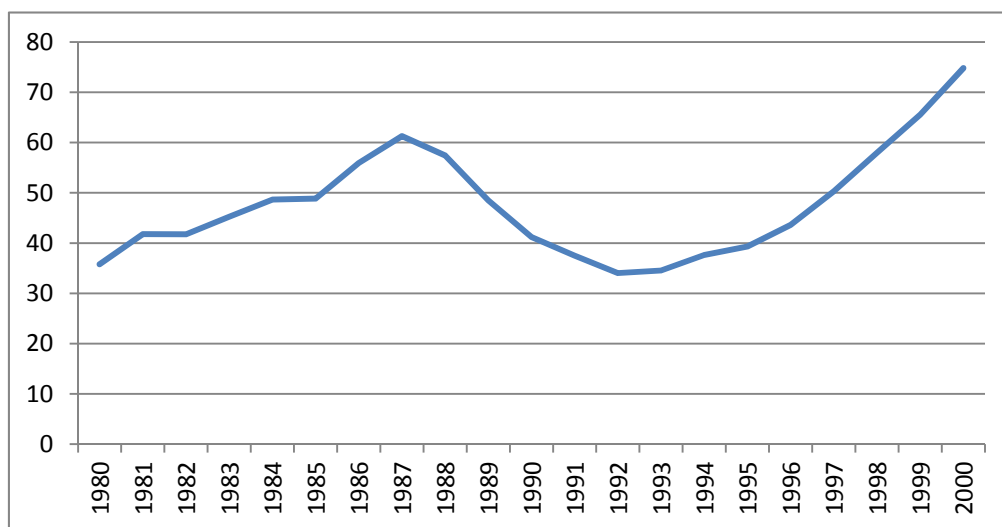
(source) FRED St. Louise FRB Data Base

Figure 4 Money Growth Rate (M2%)



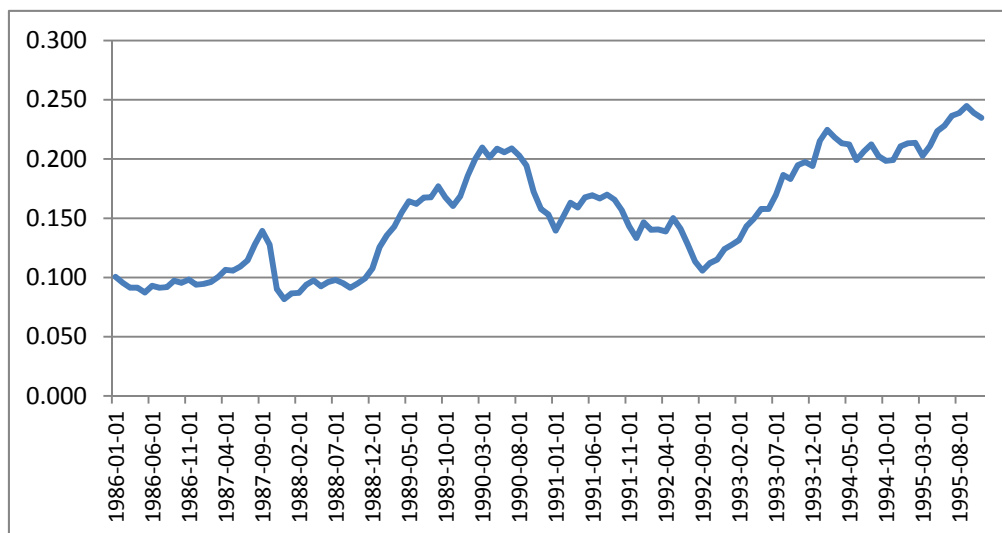
(source) FRED St. Louise FRB Data Base

Figure 5 Real price of real estate



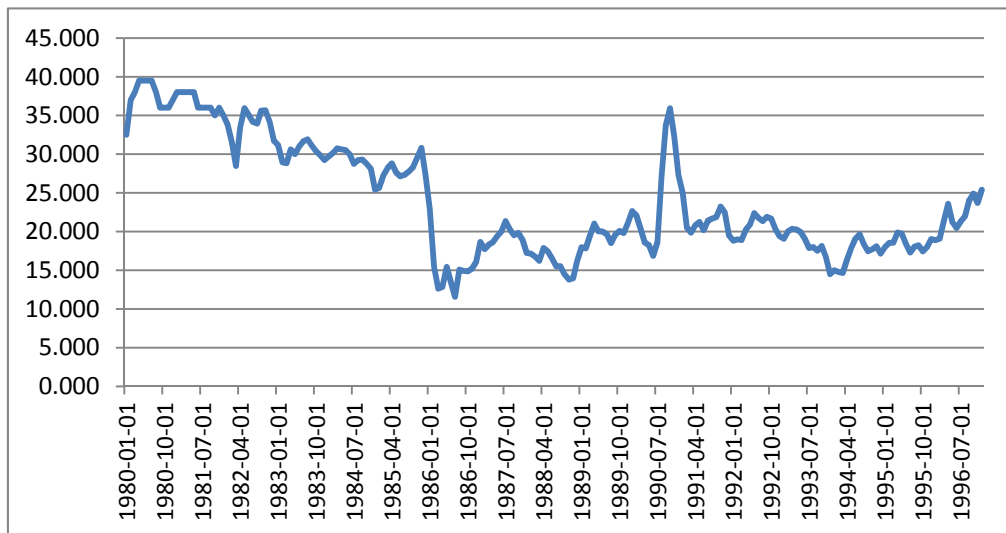
(source) FRED St. Louise FRB Data Base

Figure 6 Share Price



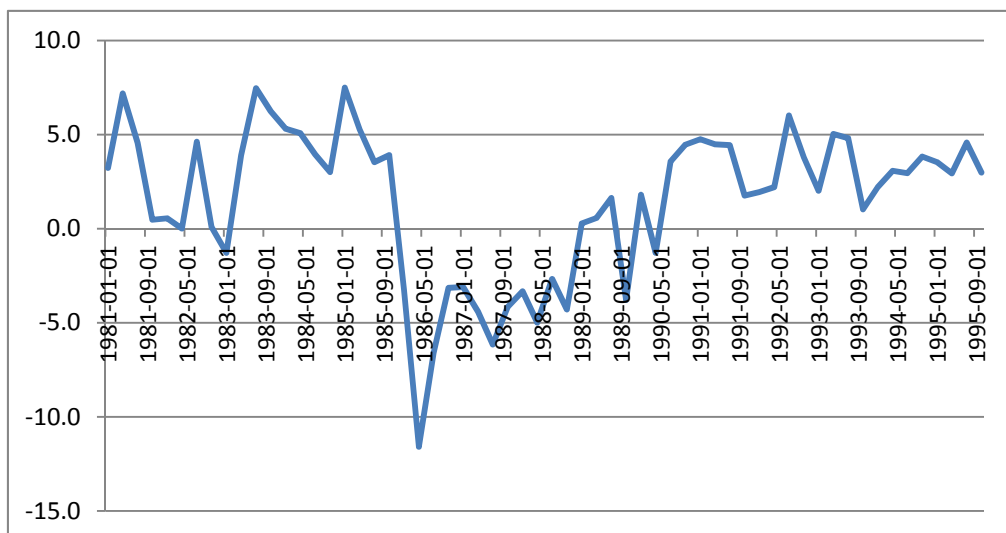
(source) FRED St. Louise FRB Data Base

Figure 7 Oil Price , us\$/barrel

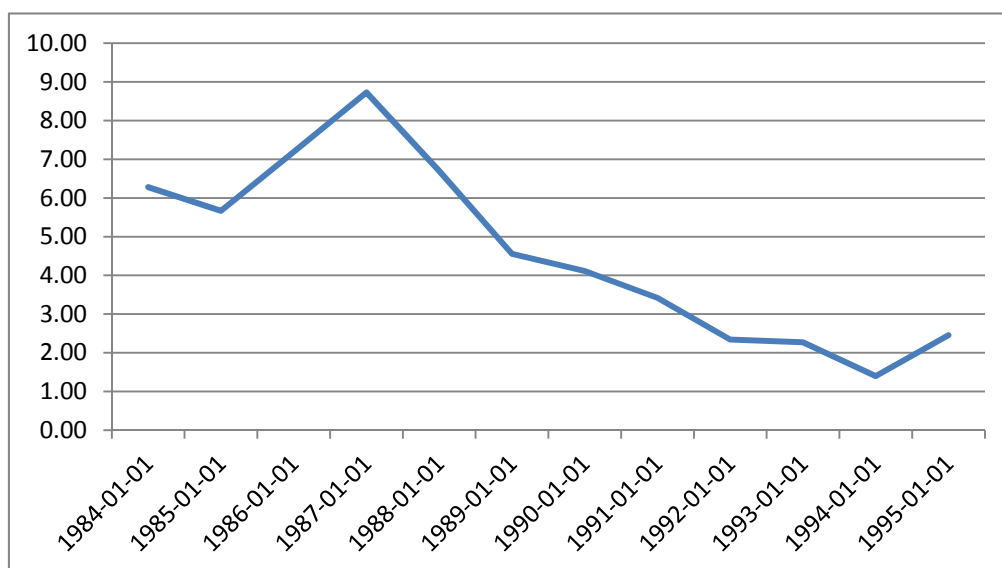


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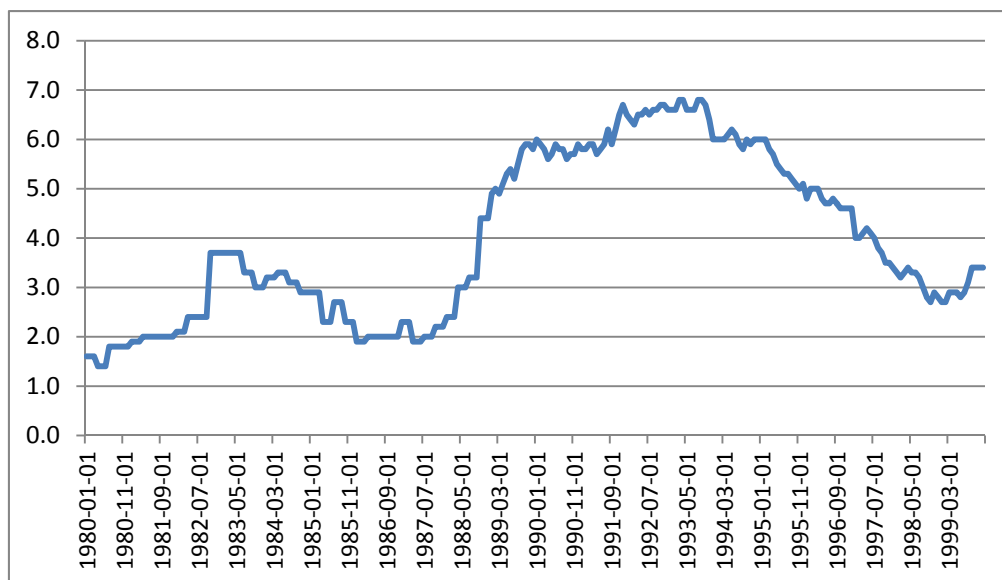
Figure 8 Current account balance (GDP%)



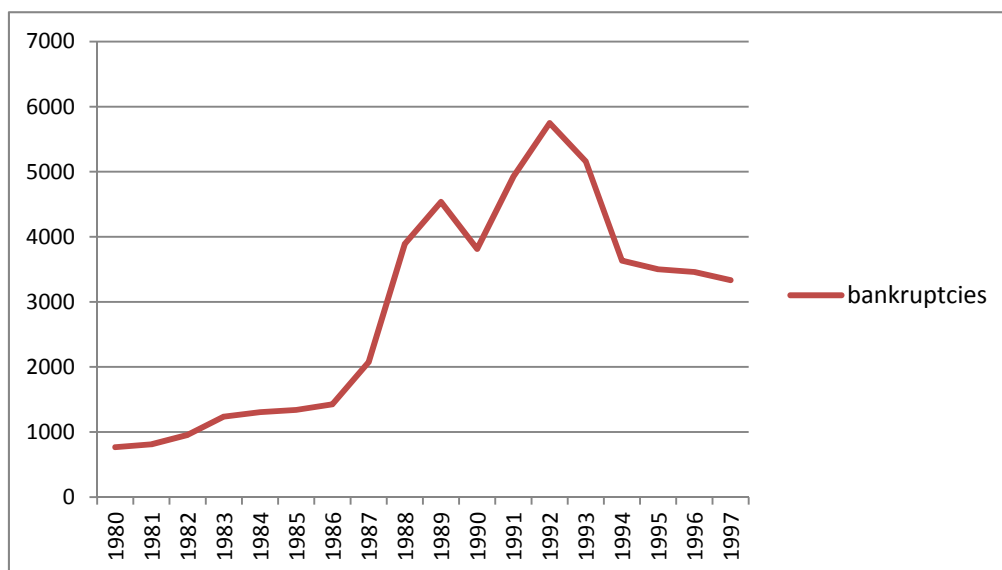
(source) FRED St. Louise FRB Data Base

Figure 9 Inflation (CPI)

(source) FRED St. Louise FRB Data Base

Figure 10 Unemployment rate (%)

(source) FRED St. Louise FRB Data Base

Figure 11 Bankruptcies

(source) Statics Norway

<https://www.ssb.no/statistikkbanken/selectvarval/saveselections.asp>

The bank credits had rapidly increased in the period 1984-1987. The money stock also rapidly increased during 1986 as reported in Figure 4. The real after-tax interest rate became almost zero. Thus, not only firms but also households increase the borrowing from financial institutes to buy house, cottage, and yachts and even expensive holidays abroad⁶. As a consequence, assets prices rapidly increased. The price of housing had increased by 40% in the period 1984 -1987 as shown in Figure 5. The share prices also rapidly increased by 1987 as reported in Figure 6. The expanded loan contributed to the rise of asset prices, which enhanced the value of borrowers' assets as their collateral, which in turn promoted bank lending.

2.3 Bubble bust

The oil price had rapidly declined in 1986 as shown in figure 7. The current account balance got worse. Its GDP ratio had rapidly fallen into the minus as shown in Figure 8. Petroleum-related industries which are principal industries in Norway were damaged. However the restrictive fiscal policy was implemented in 1987 and 1988 to reduce the real disposable income of households and to reduce imports. Monetary policy was also tightened to defend the fixed exchange rate system in December 1986. Money sock had rapidly declined. Its growth rate declined at 2.0% in Oct. 1986 after it peaked at 20.3% in Oct. 1984 as shown in Figure 4. The recession had started in 1988 when both housing prices and the share price started to decline. The real estate prices fall down by 40% from mid-1987 to

⁶ E. Steigum (1992), P.9.

1991. The GDP growth rate fall into the minus in the first quarter 1988. The deepest recession continued from 1988 to 89 as shown in Figure 9. Figure 10 reports that unemployment rate rapidly increased in 1988. Inflation rate gradually declined after it reached at 8.7% in the first quarter 1987 as shown in Figure 11. Figure 11 reports that bankruptcies rapidly increased from 1986 to 1992 in response to the decline of real estate price. Share price also rapidly declined in 1987 but soon recovered as shown in Figure 6. In Norway real estate price takes more important role in the behavior of macro economy than share price. Interest payment on housing loan was fully deductible from taxable income. The real interest rate on housing loan was almost negative. Housing market was liberalized in the early of 1980s. Apartment price came to be determined by the situation of the market. Money stock temporally increased in 1988 as shown in Figure 4. But its growth had not a positive effect on the asset price and economy. The reason seems to be that people try to hold money as precautionary demand as discussed later.

The rapid decline of real estate price started to damage the balance sheet of banks in Norway. The financial crisis erupted in the autumn of 1988, when a medium-sized commercial bank, Sunmorsbanken disclosed to have a big nonperforming loan. Immediately later many small banks, mostly savings banks also got into the financial difficulties with mounting nonperforming loans. They were merged with larger banks with the financial support of the deposit insurance. There exist two insurance, one for savings banks (Savings Banks' Guarantee Fund; SBGF) and the other for commercial banks (Commercial Banks's Guarantee Fund; CBGF). Both are private funds. However, by 1990 the deposit insurance funds for the saving banks lost almost funds. The main bankruptcy of the banks follows shortly after⁷. In Oct.1991, Christina Bank, Norway's second largest bank had bankrupt. In December 1991, another larger commercial bank, Fokus Bank had bankrupted. These two banks nationalized and owned by the government. In the end of 1991, Norway's largest bank, Den Norske Bank had bankrupted. The bank was also nationalized. Mergers and take-overs of banks was common way to achieve restructuring. Liquidations were not much used in the Nordic financial crisis. Only two small banks were liquidated in Norway⁸.

2.4 Public fund injection

The Norges Bank swiftly provided problem banks with emergency liquidity supports. The government also promptly responded to the increasing of the problem banks. They are very afraid of the spread of crisis and collapse of the financial system. They established the crises resolution agencies to manage the public support and the restructuring of the banking system, which are independent of the Central Bank and the Ministry of Finance. Their prompt response is quite different from that of the Japanese government. They were very first to recognize the financial crisis They decided to establish the Government Bank Insurance Funds, capitalized with public funds of 5 billion NOK in March, and added an another 6

⁷ E. Steigum (2006), PP.228-230 and S. Honkaopja (2009) p.23.

⁸ S. Honkaopja (2009) p25.

billion NOK to the fund and newly established the Government Bank Investment Fund with a capital of 4.5 billion NOK after the second largest bank, Christina Bank had bankrupted in Oct. 1991. Main problem banks were completely rescued by the public fund injection in 1991 and 1992, which hampered the systemic collapse of financial system in Norway. Japanese government reluctantly decided to take the same policy in 1997, seven years later after the bust of the bubble. The government's strong support for the problem banks dispelled the financial anxieties among the depositors and creditors of the Norwegian banks. The balance sheets of the banks rapidly improved in 1993, due to the strong support of the government. The public fund which was injected into the problem banks, mostly as their capital was returned to the government due to increase in share prices without the loss of taxpayers in the end. The fiscal cost of bank support during the financial crisis is estimated to be -0.4% of 2001GDP⁹. That is to say, The Norwegian taxpayers got profits by injecting their money into the problem banks.

The Central Bank underestimated the effect of the financial deregulation on credit supply and aggregate demand. Financial liberalization was a big regime change. They targeted nominal interest rate in monetary policy¹⁰. The politician did not agree to take a tight monetary policy. The largest political party, the Labor Party had insisted a lower nominal interest rate in its 1985 election campaign, though after tax real interest rate was very low. The nominal interest rate targeting policy seems to make the Central Bank to keep the easy policy. When the oil price started to decline in 1985¹¹, the Central Bank began to supply lots of liquidity into the banks in order to avoid the rise of nominal interest rate, which fueled the expansion of credit. The supply of such liquidity loans increased to 80 billion kroner in 1986¹². This easy monetary policy prolonged the credit expansion and the boom in Norway.

Norway had decided to take a floating exchange rate system in December 1992 after Norwegian currency had been attacked. The Norges Bank was obliged to defend the Krona by increasing interest rate. Monetary policy tends to be pro-cyclical under the fixed exchange rate resume. However the currency attack was not so strong as in Sweden and Finland, because of fiscal stability supported by oil production and prompt recovery of financial system. They are now free from so called irreconcilable trinity of open economy; fixed exchange rate, independent monetary policy, and free international capital flow. They

⁹ Net fiscal cost of bank support is estimated to be 5.3% of 1997 GDP in Finland and 0.2% of 1997 GDP in Sweden. See K. Sandal(2004) and S. Honkaopja (2009) p.24.

¹⁰ The Norges Bank had used the discount rate as a policy target that had to pay for rediscounting bills of exchange in the central bank. The general market rate was influenced by the Norges Bank's discount rate. However the discount rate lost its status as a key rate in 1987. Now Norges Bank uses as the key rate *the sight deposit rate*: the interest rate on the banks' deposit in Norges Bank.

¹¹ During 1986, the price of North Sea Brent Blend crude oil fell from \$27 a barrel to \$14.50 a barrel. T. Edmonds (2008) P.11.

¹² E. Steigum (1992), P.12.

now implement a monetary policy discretionarily with a target of inflation rate¹³.

3 Japan's Financial Crisis

3.1 Financial deregulation in Japan

The regulated financial market in Japan had many similar features as the financial market in the Nordic countries. As in Norway, Japanese financial system was highly regulated by the government. The interest rate was artificially kept at a low level in order to reduce the fund raising cost of the main industries. It was a kind of subsidy from the household to the industries. The Ministry of Finance strictly controlled the banks with the strong power. Security market was also strongly regulated. A cooperate finance mainly depended on the indirect financing through the financial intermediaries. Firms were strongly dependent on bank credit. The stock market in acquiring capital for firms played only a smaller role. This also characterized the Norway's capital market.

Japan's financial liberalization has started in 1980. It started first in the security markets. The restrictions concerning the fund-raising in the securities market were relaxed. As a result the Japanese large firms became less dependent on the banks. At the same time the liberalization of the deposit interest rates was only gradual and remained at a relatively high level. As a consequence the profits of the banks gradually declined. Banks were finally obliged to seek new lending opportunity among small business and property-related firms. The Japan's financial liberalization which was slow and incomplete caused the fierce competition among the financial institutes and created latter the severe problems of nonperforming loans. Hoshi (2001) empirically showed that the size of non-performing rapidly increased with growth of real estate lending, which was caused by the experience of losing existing customers to capital markets. He also showed that the rapid appreciation of land prices in the late 1980s fueled the growth of real estate lending.

3.2 Japan's bubble

Japan's bubble erupted in the latter half of 1980s after the Plaza agreement in Sept. 1985.

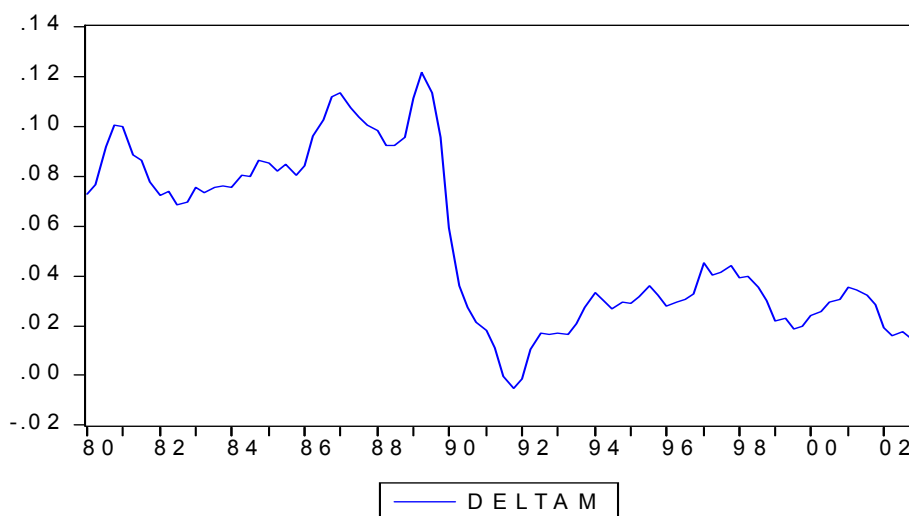
Monetary easing has begun to contribute to the decline of USA's huge trade deficits, which was caused by the highly appreciated dollar. U.S. President Ronald Reagan had taken the tight monetary policy to oppress the inflation and reduced the tax rate to vitalize the economy, when he took an office in 1980. His economic policy, called Reganomics appreciated the dollar which substantially increased the trade deficit. The U.S trade deficit with Japan accounted for over half of its total trade deficit in the 1980s. U.S congress took very hard stance to the Japanese increasing trade surplus and threatened with retaliating trade measures.

¹³ Strictly speaking, The Norges Bank currently takes flexible inflation target policy, that is, gives weight to both variability in inflation and variability in output and employment now.

The Japanese government which worried about the deterioration of the relationship between U.S. and Japan gave a strong pressure on Bank of Japan. The government persuaded the BOJ to take easy monetary policy by insisting the necessity of international coordination. Bank of Japan honestly follows to the indication of the government. The BOJ started to reduce the official discount rate; from 5% to 4.5% in January 30, 1986, from 4.5% to 4.0% in March 10, 1986, from 4.0% to 3.5% in April 21, 1986, from 3.5% to 3.0% in November 1, 1986, from 3.0% to 2.5% in February 23, 1987. The BOJ kept the then lowest rate until May 1989 for two years and three months. Money stock had rapidly increased as shown in Figure 12.

Bullish expectation became intensified. The National Land Agency predicted in 1985 that the demand for office space will rapidly increase in Tokyo as international financial center. The self-confidence prevailed among the public. Both the stock and land prices had rapidly increased from 1988 through 1989, which could not be explained rationally by the fundamentals (Figure 13 and 14). The BOJ had seriously begun to search for the timing of policy change in 1989. However both government and general public did not admit the policy change, because they thought Japan, the world's largest creditor should take a positive stance to keep the policy coordination among industrial countries¹⁴.

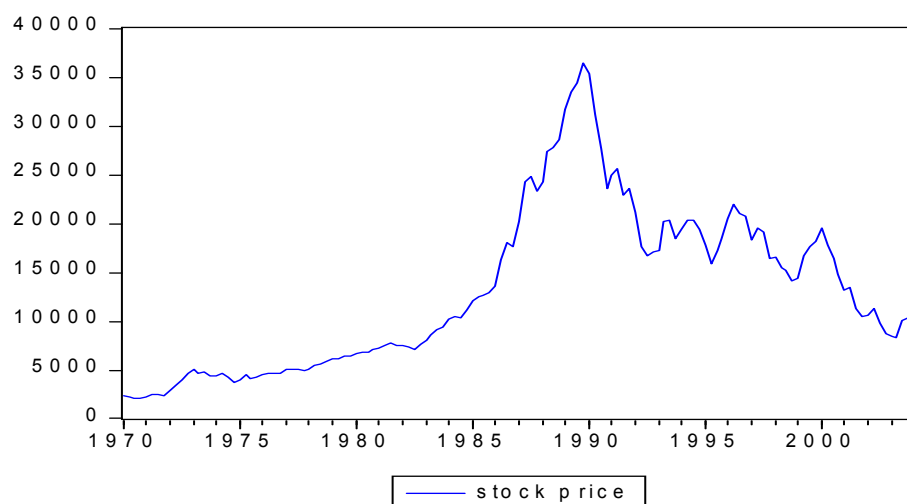
Figure 12 Money growth rate (M2%)



(source) Bank of Japan

¹⁴ The then governor of the BOJ, Toshihiko Sumita regrets his monetary policy, by saying that BOJ can't take tight policy when people enjoy the economic boom under the stable consumer price.

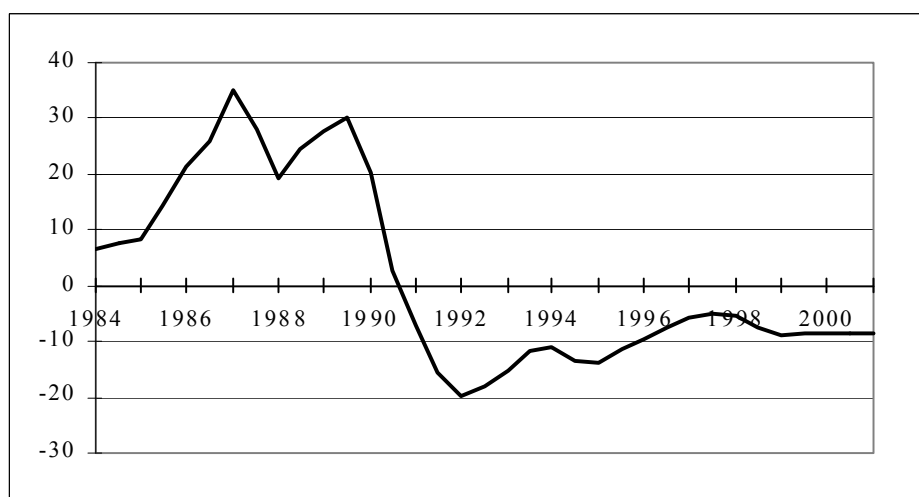
Figure 13 Share price (Nikkei Dow-Jones Index)



(source) Tokyo Stock Exchange

Figure 14 Land price (%)

(6 Large Urban Areas, average of residential, commercial, and industrial)



(source) Japan Real Estate Institute.

3.3 Bubble bust

The bubble had busted when the BOJ implemented the third rise of discount rate from 3.75 to 4.25 percent in December 1989 when a new governor Yasuo Mieno had took his office¹⁵. However the market was still bullish. Land and stock prices continued to rise to levels that could not be rationalized by the fundamentals of the Japanese economy. He had showed very strong stance to the bullish economy by fourth rise of discount rate from 4.25 to 5.25 percent¹⁶. He took the role of arbitrage of asset prices, unfortunately for the Japanese economy¹⁷. Furthermore governor Mieno had implemented the fifth rise of discount rate to 6.0 percent to avoid the homemade inflation caused by the Gulf War in August 1990. In addition the government also placed a ceiling on the total amount of financing available for real estate purchase.

The burst of the bubble began at last. The money stock (M2+CD) rapidly declined. It recorded negative year on year growth in mid -1992 as shown in Figure 12. After hitting a record high of 38,915 yen at the end of 1989, the stock price (Nikkei Dow-Jones Index) rapidly began to decline. In August 1992, stock price dipped below 15,000 yen, a 63 percent plunge from a peak level in Figure 13. Land price began to fail after hitting a peak in September 1990 and kept falling until now as shown in Figure 14. In response to the asset price decline, the BOJ reduced the discount rate six times from July 1991 to February 1993. The discount rate was ultimately reduced from 6.0 percent to 2.5 percent. The government also implemented the fiscal stimulus by spending a total of 29.9 trillion yen in two years from 1992 to 1993. Land and stock prices were promoted to decline. Prices continued to decline and increased the deflationary pressure. Firms were obliged to continue the adjustment of their balance sheet damaged by the decline of asset prices. The economy had been getting worse and worse through the financial accelerator mechanism¹⁸.

¹⁵ The BOJ had increased the official discount rate from 2.5% to 3.25% on May 31, 1989 at last. The BOJ was obliged to keep the lowest rate, 2.5% since the Louvre Agreement in 1987, to help the weak US dollar. West German which is also required to keep the monetary easing by US, changed its policy to a tight one in the summer of 1988. German could avoid the bubble, though their policy change is said one of the factors which triggered the sudden decline of NY stock market in the summer of 1988.

¹⁶ New governor Mieno was hailed as an “Onihei of Heisei era”, a famous police leader, who had strongly fought against the gangs in the Edo era more than 200 years ago. The bubble was mainly discussed from the view point of income and asset distribution. This Mieno’s episode reflect well the public feeling that “bubble-bursting” was a right minded from ethical view point.

¹⁷ Nowadays many economists understand that central bank should not take the role of the arbitrage of asset prices. See Randal Parker (2002).

¹⁸ The decline of assets price reduce the worth of collaterals, which reduce the lending ability, which decrease the lending and decline of asset prices as collateral. The vicious cycle is created starting with the first decline of asset prices. See B. Bernake, M.Gertler and S.Gilchrist (1999) and B. Bernake (2007).

3.4 Financial Crisis

Prime Minister Hashimoto who worried about the future of the government finance, made a policy to reconstruct the financial structure. He was afraid that fiscal condition would get worse and worse with the coming of aging society in Japan. He decided to increase the consumption tax from 3 to 5 percent and abolish a special income tax cut in April 1997, which amounted to a tax increase of 9 trillion yen. Consumption had rapidly shrunk in response to Hashimoto's tax increase policy¹⁹. Unfortunately for the Japanese economy, the East Asian economic crises occurred in July 1997. The fiscal contraction compounded by the Asian crisis decreased the aggregate demand substantially.

Under the deflationary conditions, a financial panic occurred. Hokkaido Takushoku Bank, one of Japan's city banks (largest twenty banks), and Yamaichi Securities Company, one of Japan's four largest security companies, failed in November 1997. The failure of two big financial institutions sent the sign that the government gave up the "too big to fail" policy. People thought no financial institutions were immune from failures. Rumors about the other banks' failure had spread out through Japan. The stock prices of many financial institutions sharply declined and "Japan premium" in the international money market jumped by around 100 basis points. Japanese banks were obliged to pay the additional basis points for raising funds in the overseas financial markets. The premium is calculated as the difference between the quoted rates of TIBOR in the Tokyo offshore market and LIBOR in the London offshore market. Bonds issued not only by Japanese financial institutions but also by Japanese government were downgraded at the investment grade ratings by international credit-rating agencies, such as Moody's.

3.5 Protracted public fund injection

The government hesitated to quickly resolve the nonperforming loans and bank problems which weakened financial institutions and caused long recession. The government officially announced in late 1995 that nonperforming loans totaled 38 trillion yen, 4 percent of outstanding loans. In 1998, nonperforming loans increased to 73.1 trillion yen, 12 percent of all loans or 10 percent of GDP. All efforts by the government and private banks to decrease nonperforming loans did not succeed in reducing them at all because of the severe deflationary pressure.

Public fund injection was heavily delayed to rescue the problem financial institutes. The delay was caused by the political turmoil to solve the problem non-banks, *jusen* which first got the severest damage by the nonperforming loans NPLs immediately after the bubble bust in 1990. Seven *jusen* (*non-bank financial institute*) were set up by the Japanese major financial institutes as their subsidiaries in 1970s, which focuses on the mortgage lending market. The *Jusen* were obliged to make a high risk investment during the boom when their

¹⁹ Hashimoto admitted his fault and regretted lots after retirement, saying that he was deceived by the official of Ministry of Finance.

parents' financial institutes expanded their business territory to the housing loan market. They were severely damaged by the burst of the bubble.

The Inspection of MOF found there was a loss of 6.4 trillion yen which reached a half of the total assets in Aug. 1995. It became a big political issue who should bear the loss, when all seven *jusen* came into insolvent. The Diet of 1996 finally passed a law that allowed injecting the public fund worth 685 billion yen, after the heated criticism and dispute.

Because it was a relief method of problem banks without any management and administrative responsibility, it drew heavy criticism from the public. After this, public funds became a political taboo subject.

In response to the serious situation, the government decided to provide 30 trillion yen funds by issuing bonds. The government still hesitated to inject public funds into the problem banks reflecting the process of the *Jusen* problem in 1996 at first. However the financial panic was so severe that neither the congress nor the public strongly opposed an injection of public funds to assist the problem banks. The public fund worth 30 trillion yen was admitted for the financial stability in February 1998 (It was expanded into 60 trillion yen in the end of 1998). The 30 trillion yen was divided into the following two categories: 13 trillion yen was prepared for the enforcement of the Deposit Insurance System, while the remaining 17 trillion yen was intended for the capital injection of the problem financial institutions.

The government actually injected 1.8 trillion yen into 21 large banks to raise their capital ratio in March 1998. However Management did not apply for sufficient amounts of funding out of fear taking responsibility. In addition, to avoid the spread of a financial crisis, this handout was evenly distributed among the banks. The convoy system, under which the government fully protects financial institutions, was upheld. Thus, the injection of funds had no significant effect on the banks. As a result Long-Term Credit Bank and Nippon Credit Bank both went bankrupt in 1998 even after the injection of public funds. The public fund worth 7.5 trillion yen was again injected in March 1999. The implementation was quite different from the former injection. Banks were strongly required to submit a detailed and meaningful restructuring plan²⁰.

3.6 Monetary easing

The signs of deflation were apparent. In response to the serious situation, both the BOJ and the government admitted at last that Japanese economy had fallen into the deflation. The Japanese economy was thus caught in a vicious circle, so-called deflationary spiral indicated by Irving Fisher (1933). Decline in demand—Decline in production and price—Decline in employment (decline in consumption) and Increase in loan in real term (decline in investment)—Decline in demand. GDP recorded negative growth for 5 consecutive quarters

²⁰ Cargil, T.F., M.H. Hutchison, and T. Ito, (2000), p. 66.

from the 1997 Q4 onward (for the first time since the start of GDP statistics in 1955).

The BOJ also realized the risky situation in the Japanese economy. The call money rate was reduced to 0.25 percent in 1998. Eventually, the BOJ conducted the zero interest policy by reducing the call money rate virtually zero percent in February 1999. Furthermore the BOJ adopted the quantitative easing policy measures in March 2001²¹. Owing to the expansionary policy, the financial panic seemed to settle down. The Japanese economy began to show signs of recovery.

4 A Statistical Analysis

The relationship between money and the real economy became unstable on the surface, because people tend to increase money as precautionary demand in the depression, especially in the financial crisis. Thus, Central Bank tends to insist that they can't do anything to revitalize the economy in the deep depression. Bank of Japan also emphasized the ineptness of monetary policy in the depression over again. For example, BOJ (2003) shows that there is not any close relationship among money stock and the real economy by performing the cointegration analysis among M2, real GDP and opportunity cost based on the data extending the period to 2002. Other researches have been performed on the monetary policy and the prolonged depression. Ugai (2006) surveys the empirical researches on the effectiveness of monetary policy, especially on the Quantity Easy Monetary Policy (QEMP) taken by the BOJ in March 2001. Many researches denied the effect of QEMP, or showed the very limited effect, if any, according to his survey.

Miyagawa and Morita (2013) analysed the relationship between the Japan's economy and money, by using the VAR mode, taking into consideration the role of financial anxieties created in the depression. They employed five variables; the Current Account Balances at the BOJ (CAB), Money Stock (M2+CD), Business Cycle of Tankan Diffusion Index, the uncollateralized overnight call rate, real GDP, and the core Consumer Price Index (CPI). They employed Business Cycle of Tankan Diffusion Index to capture the psychological change of people due to the financial anxieties.

First they performed the VAR model without taking into consideration the role of financial anxiety. They could not find a positive effect of money stock. However they could find that monetary policy has a positive effect on the real economy when they estimated again by decomposing money stock into transaction money and precautionary money, using the same VAR approach. Some argued that Japan's economy already fall into a liquidity trap in which additional monetary easing would lose its effectiveness, because the monetary base and bonds became perfect substitutes. They insisted that additional money would be absorbed as a precautionary demand even if central bank increased the base money. The

²¹ The BOJ changed the operating target for money market from the uncollateralized call rate to the outstanding current account balances held by financial institutes at the BOJ.

money stock would not have any effect on the economy if people hold additional money stock by the precautionary motivation. Miyagawa and Morita concluded that BOJ's strong commitment to continue easy monetary policy will dispel the financial anxieties, and decrease the precautionary demand. As a result monetary easing has a positive effect on the real economy even under the zero lower bound on interest rate.

The same method will be performed into the Norwegian financial crisis in this section.

4.1 The Data Property

Variables and their symbolic notations are given below. The data we estimate here are oil price, money stock defined by *m2*, bank loan, real GDP, price of real estate, inflation rate (CPI), business survey, and transaction money. These data are symbolized, respectively, *oil*, *m2*, *bankloan*, *rgdp*, *r_estate*, *inflation_cpi_a*, *b_survey*, and *trans_m2*. The reason oil price is included into the variables comes from the fact that oil industry is a key industry which has a strong influence on the Norwegian economy. Business survey is employed to capture the psychological change of people due to the financial anxieties. The data is similar to the Diffusion Index issued quarterly by Bank of Japan known as TANKAN. Transaction money is defined by the difference between money stock and precautionary demand. The precautionary demand is a function of financial anxieties. This function will be explained later. All data are obtained from FRED, Data Base of St. Louise Federal Reserve Bank.

We apply two conventional unit-root tests, DF-GLS (ERS) and KPSS test to the time series for each variable. ERS tests the unit root of the time series as the null hypothesis, while KPSS test the stationarity as the null hypothesis. The results are shown in table 2. *b_survey* becomes stationary, while *oil_texas*, *log(rgdp)* and *log(bankloan/gdpdef)* are detected to be nonstationary. *log(rm2)* and *log(r_estate)* are neither stationary nor nonstationary, and are assumed to be nonstationary. *Inflation_cpi_a* is assumed to be stationary. *log(trans_m2_modified)* to be estimated later becomes nonstationary. The 1st differenced process of each nonstationary variable is shown to be stationary, although details are omitted here for economy of space.

Table 2 Unit root test (1983q1,1995q4)

	ERS		KPSS	trend
	t-value	lag	LM-value	
<i>b_survey</i>	-2.1329**	0	0.174707	const.
<i>oil_texas</i>	-1.383537	0	0.421987*	const.
<i>log(rm2)</i>	-3.22989**	0	0.17161**	trend+const.
<i>log(rgdp)</i>	1.382083	2	1.088434***	const.
<i>log(bankloan/gdpdef)</i>	-0.301907	4	0.650723**	const.
<i>log(r_estate)</i>	-2.022997**	4	0.510605**	const.
<i>inflation_cpi_a</i>	-2.581228	1	0.088067	trend+const.

$\log(trans_m2_modified)$	-2.532530	0	0.165008**	trend+const.
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Each of ***, ** and * implies significance level of 1%, 5% and 10% respectively.

4.2 Model

We estimate the following three VAR models of the form:

$$x(t) = A_0 + A_1x(t-1) + A_2x(t-2) + \varepsilon(t), \text{ where } x \text{ is defined as follows.}$$

Model 1

$$x = \left(d\log(oil), d\log(trans_m2), d\log(restate), inflation_{cpi}, d\log(real\ GDP) \right)'$$

Model 2

$$x = (d\log(oil), d\log(trans_m2), d\log(bankloan / gdpdef), d\log(restate), d\log(real\ GDP))'$$

Model 3

$$x = \left(d\log(trans_m2), d\log(bankloan / gdpdef), d\log(restate), d\log(real\ GDP) \right)'$$

where the operator $d\log(.)$ is defined by $d\log(z(t)) = \log(z(t)) - \log(z(t-1))$

All variables are estimated by the 1st difference, following the result of unit-root test. The sample period is from Q1 1983 through Q4 1995, although estimation of precautionary demand is carried out from Q1 1980 through Q3 2005, and hence transaction money ($trans_m2 = m2 - \text{precautionary demand}$) is given during the same period 1980 through 2005.

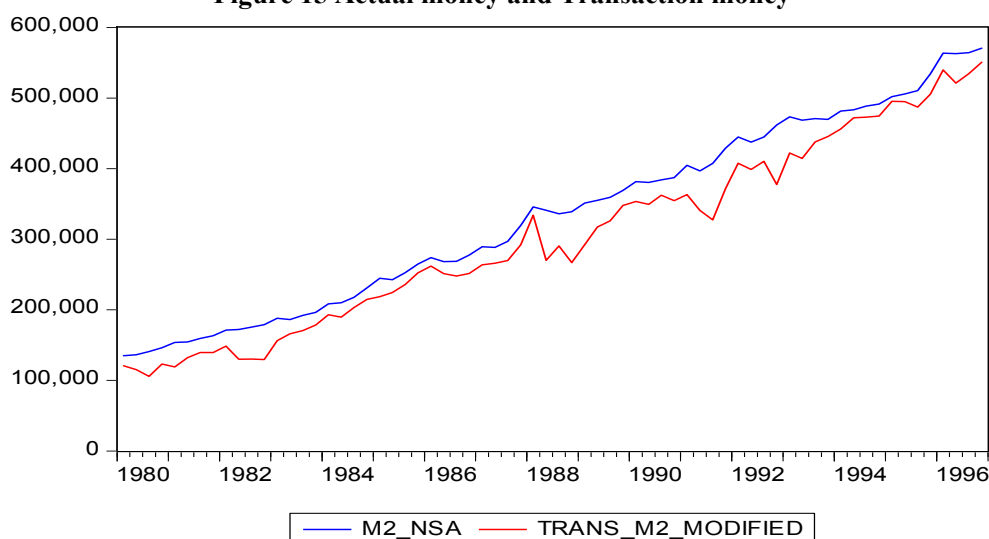
Estimation of precautionary demand in (1980q1-2005q3)

We shall consider estimation of precautionary demand in the following form:

$$d\log(rgdp(t)) = c_1 * d\log(rgdp(t-1)) + c_2 * d\log(rgdp(t-2)) + c_3 * d\log((m2(t) - \text{precautionary demand}(t-1)) / price(t-1)) + c_4 * d\log((m2(t-2) - \text{precautionary demand}(t-2)) / price(t-2)) + e(t), (1)$$

where $e(t)$ is independent and identically distributed Gaussian noise process. Maximum likelihood method is used for the estimation of precautionary demand.

The estimated precautionary demand is shown as the difference between two lines in Figure 15. The exact estimation process of precautionary demand will be shown at Appendix.

Figure 15 Actual money and Transaction money

4.3 Estimation results

The dynamic impulse response functions are displayed in Figure 16. We focus on the period of bubble and bust from 1983q1 through 1995q4.

Model 1

The first to 5th column show the dynamic responses of each variable to oil price shock, money stock shock, price of real estate shock, inflation shock and real GDP shock, respectively. The solid line shows the point estimate of impulse response function, while the dotted lines imply 95 % confidential interval. We especially focus on the monetary shock in the second column.

The interesting findings in the second column show that money stock (transaction money shock) has a positive effect on real output. Output starts to increase immediately after an increase of money. The positive effect keeps for 6 months. The positive response is statistically significant at 5 % level at first quarter and gradually insignificant with time. Monetary shock also has a positive effect on real estate price. Money certainly contributed to boost and bust the real estate price. Monetary shock has a tendency to induce inflation. In third column real estate shock has a positive effect on the real GDP. The rise of real state price seems to increase output by stimulating the consumption and investment through the wealth effect. In the fifth column GDP shock has a positive effect on real estate and a negative effect on inflation.

In the first column oil price shock has a tendency to increase GDP. But its effect is not as strong as expected. The oil price shock on money is intriguing. In Norway decline of oil price is supposed to have a negative effect on the real economy. In fact, The Norges Bank increased interest rate to defend the Krona in 1988 as already explained in the above. This

policy is thought to have caused the collapse of real estate market. The monetary policy tends to be a pro cyclical, in a small open economy like Nordic countries. But the oil price shock indicates the negative effect on the money in the first quarter. The Norges Bank is considered to take a counter cyclical policy in the burst of real estate bubble by increasing the liquidity into the market. The positive policy is interpreted to contribute to the prompt recovery.

Model 2

In order to analyse the role of bank loan, Model 2 was estimated. Figure 17 displays estimated impulse responses of oil price, transaction money, bank loan, price of real estate, and real GDP to a one-standard-deviation shock to each variable, respectively. The impulse responses of money shock on each variable show the almost same response as in Model 1. Money shock has a positive and persistent effect on the price of real estate (fourth row of second column). Money shock has a strong positive effect on the real GDP in the first quarter (fifth row of second column). Money shock has a positive effect on the bank loan (third row of second column). Increase of transaction money prompts the bank loans. Bank loan is affected by the rise of real estate price (third row of fourth column). The increase in net wealth caused by the rise of real estate price means the rise of collateral for borrowers. An increase in prices of collateral is thought to prompt the bank loan by giving the banks more incentive to engage in risky lending projects.

The bank faces the adverse selection and moral hazard in their lending activities to firms and households. A rise in price of collateral set a problem of asymmetric information in financial market at rest because of surge in borrowers' net worth²². The higher the net worth of a borrower the less that the lender will not be repaid. However the bank loan has not a positive effect on the price of real estate as the credit view suggests in the transmission mechanism of monetary policy (fourth row of third column). Thus, bank loan channel in the transmission mechanism of monetary is not found in the Norwegian economy. Schematically, the monetary policy effect works as follows, Increase in transaction money \Rightarrow real estate price (up) \Rightarrow the aggregate demand (up) through the wealth effect \Rightarrow real GDP (up)

Model 3

In order to make assure the role of bank loan, we estimated model 3, which consists of four variables; transaction money, bank loan, real estate price, and real GDP. Figure 18 displays estimated impulse response functions of four variables to a one-standard-deviation shock to each variable. The impulse of bank loan on the real state price is not detected (third row of second column), though real estate price has a positive effect on bank loan (second

²² The transmission mechanism of money shock based on the problem of asymmetric information in loan markets is referred to as the credit view. Credit view can be divided into banking lending channel and balance sheet channel, depending on the information problems in financial market. See Ben Bernanke and Mark Gertler (1995)

raw of third column). On the contrary transaction money has a strong and perpetual positive effect on the real estate price (third row of first column).

Thus, we can summarize the effect of monetary policy in Norway as follows. The paper paid attention to how bubble and bust occurred in Norway's financial crisis. The paper focused on the role of money stock in the process of bubble and bust. The monetary transmission mechanism is schematically explained as follows.

- ① Expansionary monetary policy \Rightarrow increase in transaction money \Rightarrow land price (up) \Rightarrow real GDP (up)
- ② Expansionary monetary policy \Rightarrow increase in transaction money \Rightarrow real GDP (up)
- ③ Increase in oil price \Rightarrow land price (up) \Rightarrow real GDP (up)
- ④ Increase in oil price \Rightarrow real GDP (up)
- ⑤ Increase in land price \Rightarrow bank loan (up)

Figure 16 Impulse Response Functions, Model 1

d(oil_texas) dlog(trans_rm2_modified) inflation_realestate inflation_cpi_a dlog(rgdp) lag=2

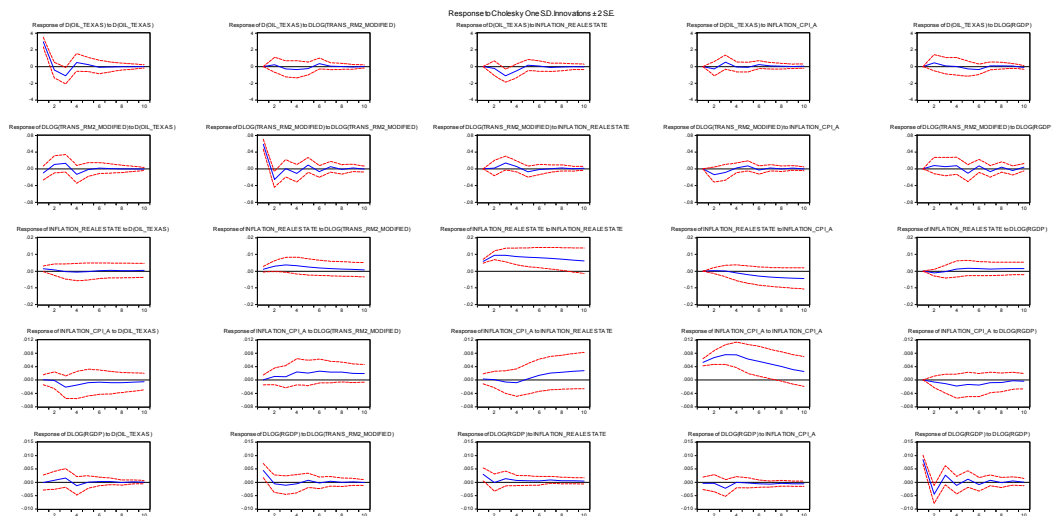


Figure 17 Impulse Response Functions, Model 2
 $d(oil_texas)$ $dlog(trans_rm2_modified)$ $dlog(bankloan/gdpdef)$ $inflation_realestate$
 $dlog(rgdp)1983q1-1995q4$ Lag=2

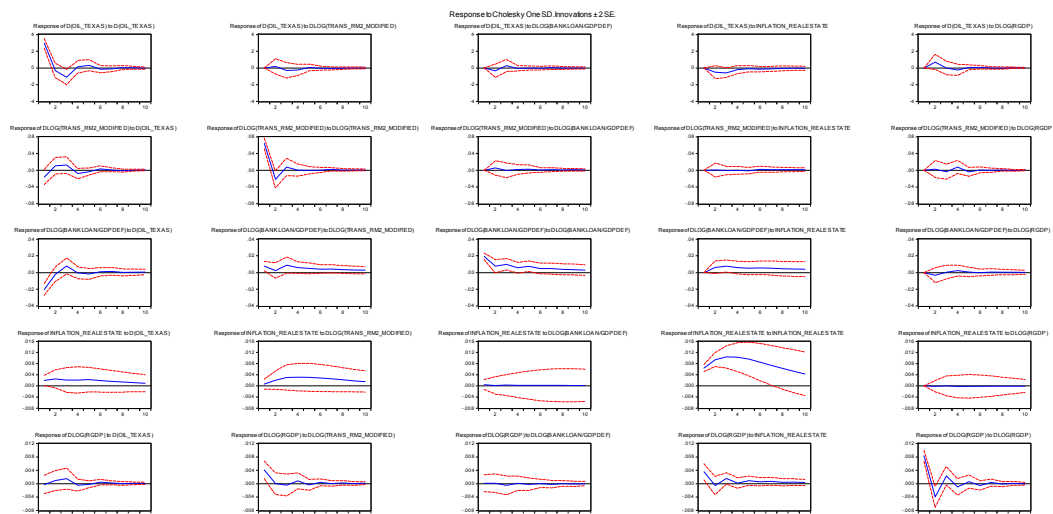
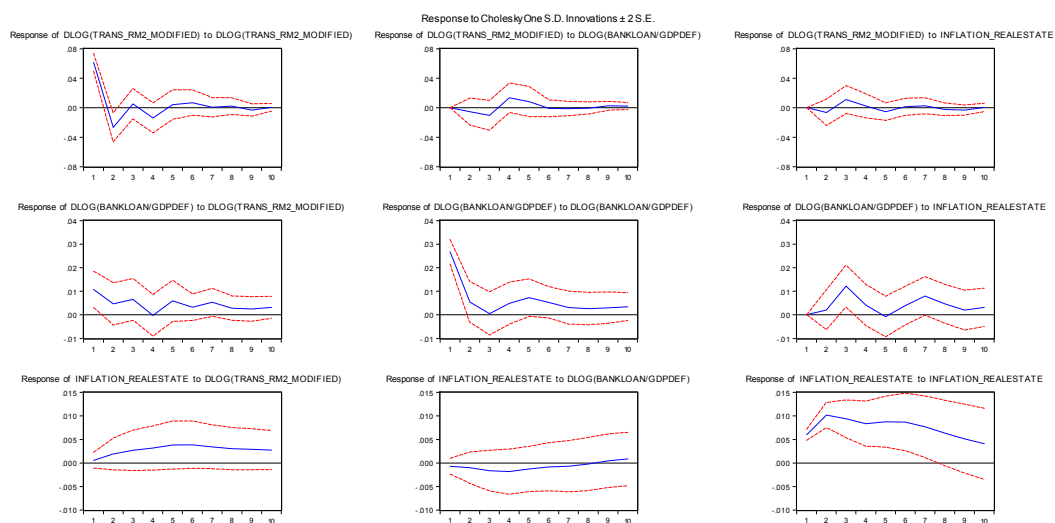


Figure 18 Impulse Response Functions, Model 3
 $dlog(trans_rm2_modified)$ $dlog(bankloan/gdpdef)$ $inflation_realestate$
 1983q1 1995q4 Lag=4



5 Conclusion

The bubble is caused by monetary easing under the financial deregulation. The bubble busts by the external negative shock, such as a sudden monetary policy change in Japan or unexpected decline of oil price in Norway. The policy response after the collapse is important. Monetary easing and public fund injection takes a crucially important role to revitalize the economy after the collapse. The latter is especially important to avoid the collapse of financial system²³. The policy response of both countries was quite different. In the case of Japan, both of monetary easing and public fund injection was delayed. The policy mistake caused the prolonged recession, called “lost two decades in Japanese economy”. On the contrary Norwegian government swiftly responded to the crisis, by establishing a new fund to rescue the problem banks. As a result, they could regain the tax money with some profits after the crisis ended. The reason why project funds injection was delayed in Japan was explained as follows. Bank management, Government, and politicians tried to avoid their responsibility. Bank management were afraid to be blamed for mismanagement and restructuring. Government also try to avoid blame from the public for insufficient monitoring. Politician was afraid to lose the vote by using tax payer's money. To make matters worse everybody believed that land prices would recover in due course. The myth of Land, land price will never decline, was survived in Japan.

The delay of monetary easing is also very important factor. The BOJ did not take a positive easy monetary policy until the economy fell into the severe crisis in 1998, though many researches has been done to blame BOJ's negative policy stance. The BOJ repeatedly insisted there do not exist the cointegration between money and economy by showing the statistical evidence. They also argued that central bank can't do anything to revitalize the economy, which fell into the liquidity trap.

The statistical evidence shows that money had played an important role in the bubble and bust cycles in Norway. The Norges Bank changed the exchange rate system from the pegged to floating after the bubble bust. The Norges bank was free from the irreconcilable trinity of open economy; fixed exchange rate, independent monetary policy, and free international capital flow. The new resume made it possible for central bank to implement discretionary monetary policy. The Bank also adopted the inflation target policy in 1999 to avoid inflation. These policies can be thought to contribute to the recovery and the stability in the Norway's economy.

Appendix

The estimation of precautionary demand is estimated as follows.

First precautionary demand is assumed to be

²³ The stability of financial system is important to increase in transaction money, though the empirical evidence does not support the importance of bank loan in the process of bubble and bust.

$$precautionary\ demand = /k1 + k2 * ngdp + k3 * b_survey * m2 /, \quad (A1)$$

where, the 2nd term on the RHS means that precautionary demand is a function of GDP as Keynes said, and where the 3rd term means the fact such that precautionary demand increases in depression and decreases in heated economy, that is, precautionary is a function of business survey multiplied by $m2$ money. Assuming that each of the oil crisis in 1979 and Lehman shock in 2008 exhibits the same amount of business survey, the amount of precautionary demand apparently differs each other. Therefore, b_survey in (A1) is multiplied by $m2$

(Remark) Since b_survey in (A1) takes negative value as well as positive value, we have to introduce the absolute value notation $| \cdot |$. Without the absolute value formulation, the maximum likelihood estimation does not give us convergence result of calculations in many cases.

The concrete formulation and calculation results are given by :

$$\begin{aligned} dlog(rgdp) = & c(2) * dlog(rgdp(-1)) + c(3) * dlog(rgdp(-2)) \\ & + c(4) * dlog((m2_nsa(-1) - @abs(c(5) + c(6) * (ngdp(-1)/10000)^1 + c(8) * b_survey(-1) * m2_nsa(-1)/100000)) / gdpdef(-1)) \\ & + c(40) * dlog((m2_nsa(-2) - @abs(c(5) + c(6) * (ngdp(-2)/10000)^1 + c(8) * b_survey(-2) * m2_nsa(-2)/100000)) / gdpdef(-2)) \end{aligned} \quad (A2)$$

LogL: LOGL01A_RM2
Method: Maximum Likelihood (Marquardt)
Date: 08/20/14 Time: 13:45
Sample: 1980Q4 2005Q3
Included observations: 100
Evaluation order: By observation
Convergence achieved after 35 iterations

	Coefficient	Std. Error	z-Statistic	Prob.
C(2)	0.083713	0.100341	0.834279	0.4041
C(3)	0.530971	0.102943	5.157903	0.0000
C(4)	0.027660	0.024063	1.149465	0.2504
C(5)	8411.175	15001.24	0.560698	0.5750
C(6)	1694.278	1460.193	1.160311	0.2459
C(8)	-1017.155	683.4280	-1.488314	0.1367
C(40)	-0.044171	0.031496	-1.402438	0.1608
C(50)	0.009861	0.000729	13.53365	0.0000
Log likelihood	319.5117	Akaike info criterion		-6.230235
Avg. log likelihood	3.195117	Schwarz criterion		-6.021821
Number of Coefs.	8	Hannan-Quinn criter.		-6.145886

Since b_survey can be described by

$$b_survey = \max\{b_survey, 0\} + \min\{b_survey, 0\},$$

we change b_survey by introducing

$$modified\ b_survey = \max\{b_survey, 0\} + K * \min\{b_survey, 0\}, \quad (A3)$$

where K is set to be 0.37268. Replacing b_survey in (A1) by the above $modified\ b_survey$ in (A3) with the estimated parameters $c(.)$ fixed, we can see that

$$\begin{aligned} & /k1+k2*ngdp+k3*modified\ b_survey*m2 / = k1+k2*ngdp+k3*modified\ b_survey*m2 \\ & = nonnegative, \end{aligned} \quad (A4)$$

that is, we need not mind the situation stated in Remark. We call modified precautionary demand with b_survey replaced by $modified\ b_survey$, and hence we define

$$trans_m2_modified = m2 - modified\ precautionary\ demand. \quad (A5)$$

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